Remarks:

Reconsideration of the application is requested.

Claims 12-23 are now in the application. Claims 1-11 have been cancelled.

The new claims are supported in the original disclosure and they are specifically supported by the originally filed claims. Additional support is found in the specification in the paragraph bridging pages 3 and 4. We describe here a process for increasing surface area for microscopic structures by a one-step deposition process. As stated in the specification, this novel process is advantageous as compared to the prior art multi-step processes which typically include depositing an amorphous layer, seed formation on the amorphous layer and subsequent annealing.

We now turn to the art rejection, and we begin with the reference Madhukar et al., US 6,344,403 B1. The reference is not available as prior art against this application. As stated in the enclosed Declaration under Rule 131, the invention described and claimed in the instant application was conceived and reduced prior to June 16, 2000. That date is the earliest prior art date of the reference Madhukar et al. under 35 U.S.C. § 102(e). The corroborating evidence underlying the Declaration under Rule 131 speaks for itself and need not be

commented on in detail. The Rule 131 Declaration is corroborated by an invention disclosure (*Erfindungsmeldung*) which was submitted by the inventors to their corporate superior and which carries various receipt stamps of January 4, January 10, and February 3, 2000. All of these dates, including the hand-written dates of December 12, 1999 antedate the effective date of the reference Madhukar et al. of June 16, 2000. We enclose only sheets 1, 2, and 3 of five sheets, because sheets 4/5 and 5/5 contain confidential employment information which has no bearing on the matter at hand. Sheet 2/5 contains written disclosure and a certified translation of that disclosure (without the hand-written inserts) is attached. Additional information is found in the two pages of micrograph information which formed a part of the original invention disclosure. Should the Examiner have any questions with regard to the original disclosure, counsel would be glad to discuss the matter by telephone.

Claims 1-4, 6-8, and 11 were rejected as being anticipated by Lin et al. '219 under 35 U.S.C. § 102(a). We respectfully traverse on the basis of the amended claims.

Lin '219 describes a process in which the surface area of crown shaped capacitor elements is increased. While the object is generally similar to the object described by applicants, the reference deals only with crown shaped capacitor

applications. Specifically, there is formed a main structure with one or more layers of amorphous silicon and the amorphous silicon layer is then covered in an HSG process. The HSG silicon layer is then annealed and completely integrated with the underlying amorphous silicon layer and the heavy doping of the underlying layer is outdiffused into the HSG structure.

Lin '219 describes a process that is considered prior art with regard to this invention. The multi-step process of Lin is described on pages 1 and 2 of the specification. Lin's process is described as a three-step process including pre-cleaning, seeding, and annealing. Specifically, Lin describes the process sequence as follows:

> A first chamber, of a cluster tool, is used to perform a HF vapor pre-clean procedure, on the exposed surfaces of crown shape storage node shape 18a, at a temperature between about 20 to 30° C., and at a pressure between about 10 to 20 torr.
>
> The selective deposition of HSG silicon seeds 19a, is next accomplished, in situ, in a second chamber of the cluster tool, without exposure to air, between the pre-clean and the HSG seeding procedures. HSG silicon seeds 19a, are formed at a temperature between about 550 to 580° C., at a pressure less than 1 torr, using silane as a source, diluted in a nitrogen ambient. An anneal procedure, performed at a temperature between about 550 to 580° C., at a pressure less than 1.0 torr, in a nitrogen ambient, in the second chamber of the cluster tool, is then used to convert HSG silicon seeds 19a, to HSG silicon layer 19b, shown schematically in FIG. 9, forming crown shaped storage node electrode 18b.

> After removal of the samples from the cluster furnace, a second anneal cycle is performed in another furnace, at a temperature between about 800 to 850° C. This anneal procedure allows outdiffusion from the sandwiched, heavily doped amorphous silicon layer, to the undoped, or lightly doped amorphous silicon layers, thus providing adequate doping throughout the crown shaped storage node electrode 18b, thus preventing a capacitance depletion phenomena that would have occurred if the doping levels, of the undoped, or lightly doped amorphous silicon layers, were not increased after HSG silicon seed deposition.

Lin et al., col. 6, lines 38-67 (formatting added).

In other words, a precleaning step in a first chamber is followed by the HSG deposition in a second chamber, which is followed, in the second chamber, with a first anneal. At this point, the HSG silicon is not ready for further processing. Instead, the batch is moved to another furnace in which a second anneal is performed at a yet higher temperature which causes the outdiffusion of the heavy silicon doping.

The claims of the instant application simplify this process by forming the semiconductor grains directly on the surface and the microroughness is accepted without a subsequent annealing step. According to claim 22, the microroughness is formed on the surface directly from the process gas without allowing additional steps. That is, claim 22 is a closed process which, for producing the microroughness, does not allow for any additional processing.

Claim 23 is directed to a sub-process in the production of a trench capacitor. As stated in the introductory specification, the claimed invention is particularly suitable for such trench capacitor processing, because of the direct formation of the semiconductor grains from the process gas without any formation of an amorphous layer. The process of Lin '219 is entirely unsuitable for a trench capacitor because of its required formation of an amorphous silicon layer. Also, Lin '219 does not provide the disclosure required for any suitable process parameters which would lead to the very detailed and specific formation of the semiconductor grains with the attendant relative grain spacing as shown in Fig. 8.

Lin '219, therefore, does not anticipate the invention defined in either claims 12, 22, or 23.

Claims 1-8, 10, and 11 were rejected as being anticipated by Lin et al. '221 under 35 U.S.C. § 102(a). We respectfully traverse on the basis of the amended claims.

Lin '221 has a quite similar disclosure as the above-discussed earlier Lin patent. In Lin '221, the HSG seeding is effected in a similar process as described above. There is no disclosure in Lin '221 according to which the semiconductor grains could be formed directly from process gas in a one-step process without more.

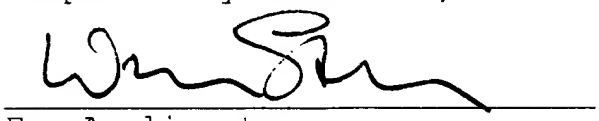
Lin '221 provides disclosure with regard to growing HSG silicon seeds 13 only on the storage node shape 12 without seeding the silicon nitride layer 9. Lin '221 further states that the seeding is effected on an oxide-free, amorphous silicon surface. The seeding process is followed by a "critical anneal cycle . . . in the same UHV system" which results in the formation of the HSG silicon layer 14. See Lin '221, col. 5, lines 3-23.

It is thus clear that Lin et al., both in the '219 and in the '221 patent, describe the seeding process which is followed by an annealing process and the complete integration of the seed layer in the underlying (oxide-free) amorphous silicon layer.

In summary, neither of the two Lin references, nor any other references of record, whether taken alone or in any combination, either show or suggest the features of claims 12, 22, and 23. These claims are, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent thereon, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 12-23 are solicited.

Respectfully submitted,



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February 7, 2003

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